WE CLAIM:

1. An automotive transmission assembly having at least one shaft and at least one gear set operatively coupled to said shaft to provide low and reverse gear ratios, said transmission assembly comprising:

a transmission casing for supporting the shaft and the gear set of said transmission assembly;

said gear set including a sun gear operatively coupled to a source of torque in said transmission assembly, a ring gear mounted for rotation about said sun gear and a plurality of pinion gears supported by a carrier for meshing rotation about said sun gear and between said ring gear and said sun gear, said carrier operatively coupled to said shaft;

a friction clutch assembly including an inner hub operatively connected to said ring gear of said gear set, an outer hub fixed to said transmission casing and a clutch pack interposed between said inner hub and said outer hub and operable to connect said inner and outer hubs together;

a bi-directional clutch assembly having an inner race operatively coupled to said transmission casing, an outer race operatively coupled to said ring gear and said inner race of said friction clutch assembly and an engagement mechanism supported between said inner and outer races of said bi-directional clutch assembly, said engagement mechanism including a first set of pawls and a second set of pawls operatively supported between said inner and outer races;

at least one actuating cam disposed adjacent said inner and outer races and including a plurality of disengagement portions and a plurality of engagement portions, said engagement and disengagement portions cooperating with said first and second sets of pawls to selectively disengage said first and second sets of pawls to provide freewheeling relative rotation between said inner and outer races; to selectively actuate at least one pawl of said first set of pawls so that torque is translated in a first rotational direction when said transmission assembly is in low gear but allowing

freewheeling relative rotation between said inner and outer races in a second rotational direction that is opposite to said first rotational direction when said transmission assembly is in any higher gear; to selectively actuate at least one pawl of said second set of pawls so that torque is translated in said second rotational direction opposite to said first rotational direction when said transmission assembly is in reverse gear but allowing freewheeling relative rotation in said first rotational direction when said transmission assembly is in any gear greater than first; and to selectively actuate at least one pawl of said first and second sets of pawls so that torque is translated between said inner and outer races in both of said first and second rotational directions to provide engine breaking.

2. An automotive transmission assembly as set forth in claim 1 wherein said assembly includes a pair of actuating cams, each of said pair of actuating cams associated with one of said first and second sets of pawls, each one of said pair of actuating cams including a flat disc portion having a plurality of disengagement portions spaced about the outer periphery of said flat disc portion and operable to move said pawls out of engagement between said inner and outer races and a plurality of engagement portions spaced about the outer periphery of said flat disc portion and operable to move said pawls into engagement between said inner and outer races.

3. An automotive transmission assembly as set forth in claim 2 wherein said pair of actuating cams are supported for incremental, coaxial rotational movement on opposite sides of said inner and outer races.

4. An automotive transmission assembly as set forth in claim 1 wherein said engagement mechanism includes a plurality of pockets formed on the inner circumference of said outer race and a plurality of teeth formed on the outer circumference of said inner race.

5. An automotive transmission assembly as set forth in claim 4 wherein said

plurality of pockets includes first and second sets of pockets that correspond to said first and second set of pawls and wherein each pocket in said first set is located adjacent to a pocket from said second set and each pocket in said first set is oriented in an opposite direction relative to an adjacent pocket of said second set about the inner circumference of said outer race.

6. An automotive transmission assembly as set forth in claim 5 wherein each pawl of said first and second sets of pawls is moveably supported in a corresponding one of said first and second set of pockets such that each pawl of said first set is adjacent to a pawl from said second set of pawls and such that each pawl in set first set is oriented in an opposite direction relative to an adjacent pawl from said second set of pawls and wherein said first set of pawls acts to translate torque between said inner and outer races in said first rotational direction when at least one pawl from said first set of pawls is disposed in its engaged position and said second set of pawls act to translate torque between said inner and outer races in said second rotational direction that is opposite to said first rotational direction when at least one of pawl of said first set of pawls is disposed in its engaged position.

7. An automotive transmission assembly as set forth in claim 1 wherein said shaft is operatively connected to the output of said transmission assembly and said carrier is operatively connected to at lease one other gear set of said transmission assembly.